

**IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OKLAHOMA**

STATE OF OKLAHOMA, ex rel,
W. A. DREW EDMONDSON,
in his capacity as ATTORNEY GENERAL
OF THE STATE OF OKLAHOMA,
and OKLAHOMA SECRETARY
OF THE ENVIRONMENT
C. MILES TOLBERT, in his capacity as
the TRUSTEE FOR NATURAL RESOURCES
FOR THE STATE OF OKLAHOMA,

Plaintiff,

V.

TYSON FOODS,	\$
TYSON POULTRY, INC., TYSON CHICKEN, INC.,	\$
COBB-VANTRESS, INC., AVIAGEN, INC.,	\$
CAL-MAINE FOODS, INC.,	\$
CAL-MAINE FARMS, INC., CARGILL, INC.,	\$
CARGILL TURKEY PRODUCTS, LLC,	\$
GEORGE'S, INC., GEORGE'S FARMS, INC.,	\$
PETERSON FARMS, INC., SIMMONS FOODS,	\$
INC. ANDWILLOWBROOK FOODS, INC.	\$

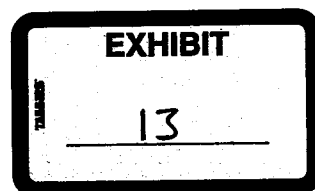
Defendants.

CASE NO. 05-CV-329-
GKF-SAJ

AFFIDAVIT OF BERNARD ENGEL, Ph.D

The undersigned, Bernard Engel, does solemnly swear and state:

1. I hold a B.S. and M.S. in Agricultural and Biological Engineering from the University of Illinois and a Ph.D. in Agricultural Engineering from Purdue



University. I am a registered professional engineer in the State of Indiana. Since 1988 I have been a faculty member in the Purdue University Department of Agricultural and Biological Engineering. I am currently Department Head and Professor within this program. My research, teaching and outreach expertise are in environmental engineering and the application of information systems technologies to environmental problems. I have extensive experience in developing and applying computer models, databases, and geographic information systems to a range of environmental issues. In this regard, I have developed hydrologic/water quality models and decision support systems that are widely used by consultants and local, state and federal agencies. My work has allowed me to obtain extensive experience in applying models and information technologies to assess nutrient and pesticide movement in surface waters of watersheds and into watershed groundwater. I have published more than 100 articles on related topics in peer reviewed scientific journals.

2. I have been retained by the Oklahoma Attorney General to evaluate the generation and land application of poultry waste within the Illinois River watershed (IRW). In addition, I have been asked to evaluate the movement of this waste and its constituents into streams, rivers, and groundwaters within the IRW and into Lake Tenkiller.

3. Based upon review of relevant scientific literature, aerial photographs, reports of investigators retained by the Oklahoma Attorney General, and the Oklahoma

Department of Agriculture Food and Forestry (ODAFF) records, each of the Defendants (Cal Maine Foods, Cargill, Georges, Peterson Farms, Simmons Foods, Tyson (including Cobb-Vantress), and Willow Brook Foods) generate a significant volume of poultry waste within and near the IRW. Furthermore, each of the Defendants and/or their growers have land applied a significant amount of these poultry wastes by simple surface broadcast spreading on lands located within the IRW. Records generated by the Eucha/Spavinaw Watershed Management Team (working under the supervision of the U. S. District Court, Northern District of Oklahoma) were used to reach and verify these conclusions. These records are for the Spavinaw Creek Watershed which adjoins the IRW on the north. The Defendants' poultry operations in the Spavinaw Watershed operate in the same way as their operations in the IRW. These Court-supervised records (along with other information specific to the IRW poultry operations including: (1) the number and ownership of poultry houses, (2) the type of bird grown in each house, and (3) the size of these poultry houses provide detailed information from which poultry waste volumes for each and all of the Defendants were calculated. Using this methodology, the aggregate annual production of poultry waste from all of the Defendants' operations in the IRW is approximately 347,000 tons. The estimated annual generation of poultry waste in the IRW for each Defendant is as follows: Cal-Maine Foods – 2,950 tons; Cargill – 17,870 tons; Georges – 59,570 tons; Simmons Foods – 63,600 tons; Peterson Farms – 36,700 tons; Willow Brook Farms -2,710 tons; and Tyson – 163,650 tons. Furthermore, ODAFF records for the period 03/31/1998 – 04/05/2006 document a part of the disposal of

poultry waste in the Oklahoma portion of the IRW. (Only a part of total waste disposal on IRW land is believed to be reflected in these ODAFF records and my calculations below because some of the ODAFF records are not sufficiently specific to identify the precise geographic location of land application and similar, detailed records are not kept for land disposal of poultry waste in Arkansas portion of IRW.) These ODAFF records show for that time period (03/31/1998 – 04/05/2006), each Defendant or its growers contributed to land disposal of poultry waste within the Oklahoma portion of the IRW as follows: Cal-Maine Foods – 4,188 tons; Cargill – 3,096 tons; Tyson – 59,753 tons; Georges – 3,165 tons; Peterson Farms – 4,873 tons; Simmons Foods - 20,532 tons; and Willow Brook Foods – 1,768 tons. It is important to emphasize that, although these numbers reflect significant land disposal, because of the lack of record keeping for land disposal and the analysis below that shows that the great majority of poultry waste (80%) is land applied within five miles of the farm on which it is generated, tens of thousands of tons of poultry waste are land applied each year in the IRW in addition to the amounts stated above.

4. Based upon the same reports and sources, poultry wastes are typically disposed by land application very near to the poultry houses in which they are generated. Using the records retained by the Oklahoma Department of Agriculture and Forestry (ODAFF), 30% of poultry wastes generated in the Oklahoma portion of the IRW by the Defendants are land disposed within one mile or less of where they are generated. Additionally, 60% of such poultry wastes are disposed within

two miles or less of where they are generated and 80% of such poultry wastes are disposed within five miles or less of where they are generated. This spatial Pattern of poultry waste disposal by land application close to their place of generation that was recorded for the Oklahoma portion of the IRW is similar to that recorded for disposal of poultry waste within the State of Oklahoma as a whole. Although no extensive detailed records linking poultry waste generation locations to specific disposal locations exist for Arkansas, based upon review of relevant scientific literature and reports of investigators retained by the Oklahoma Attorney General, the spatial pattern of waste disposal in the Arkansas portion of the IRW is the same as the disposal pattern in the Oklahoma portion of the IRW. Additionally, specific ODAFF records demonstrate that growers for each of the Defendants land apply a significant amount of their poultry waste within the IRW. Consequently, I conclude that the vast majority of the poultry waste generated by the Defendants' operations within the IRW is also land applied within the IRW.

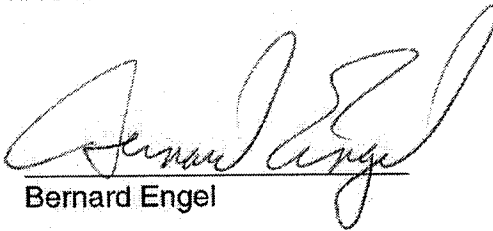
5. Using this same evaluation of ODAFF records, it is also my opinion that a significant amount of poultry wastes generated outside of the boundaries of the IRW is land applied within the IRW. This is in addition to the land applied poultry waste discussed above that is generated within the IRW and applied within its borders.

6. Based upon a review of relevant scientific literature, reports of investigators retained by the Oklahoma Attorney General and ODAFF records,

poultry wastes are typically disposed by land application within the IRW during the winter and spring, a period of high rainfall and high runoff within the IRW.

Approximately 70% of land applied poultry wastes are disposed of by land application within the IRW during the period of January through June of each year and approximately 50% of land applied wastes are disposed of from March – June of each year. This pattern of land application of poultry waste observed for the Oklahoma portion of the IRW is similar to that recorded for the State of Oklahoma as a whole, and, based on the analysis discussed above, this late winter through spring into early summer temporal pattern and practice of waste disposal is concluded to be the same in both the Oklahoma and Arkansas portions of the IRW.

FURTHER AFFIANT SAYETH NOT.


Bernard Engel

Subscribed and sworn to me by Bernard Engel, on the 12th day of November, 2007.

Michelle Creech
Signature

Michelle Creech
Printed Name

MICHELLE CREECH
NOTARY PUBLIC STATE OF INDIANA
MONTGOMERY COUNTY
MY COMMISSION EXP. AUG. 2, 2009

Notary Public, State of Indiana, County of Montgomery

My Commission Expires: August 2, 2009